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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,664	01/17/2002	Paul David Cannon	ROCH-001DIV	4008

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EXAMINER	
BASI, NIRMAL SINGH	

ART UNIT	PAPER NUMBER
1646	

DATE MAILED: 11/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/052,664	CANNON ET AL.	
	Examiner	Art Unit	
	Basi N [redacted]	1646	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 May 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 November 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. Applicant is advised that the Notice of Allowance mailed is vacated. If the issue fee has already been paid, applicant may request a refund or request that the fee be credited to a deposit account. However, applicant may wait until the application is either found allowable or held abandoned. If allowed, upon receipt of a new Notice of Allowance, applicant may request that the previously submitted issue fee be applied. If abandoned, applicant may request refund or credit to a specified Deposit Account.

2. Prosecution on the merits of this application is reopened on claim1 considered unpatentable for the reasons indicated below:

Claim Rejections - 35 USC § 101 and 35 USC § 112, 1st paragraph

The following is a quotation of 35 U.S.C. 101:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 is rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility.

A "specific utility" is a utility that is specific to the subject matter claimed, as opposed to a "general utility" that would be applicable to the broad class of the invention. A "substantial utility" is a utility that defines a "real world" use. Utilities that require or constitute carrying out further research to identify or reasonably confirm a "real world" context of use are not substantial utilities. A "well established utility" is a utility that is well known, immediately apparent, or implied by the specifications disclosure of the properties of a material, alone or taken with the knowledge of one skilled in the art. A "well established utility" must also be specific and substantial as well as credible.

Based on the record, there is not a "well established utility" for the claimed invention. Applicant has asserted utilities for the specifically claimed invention of claim 1. The invention is directed to an isolated Npt2b polypeptide comprising the amino acid sequence set forth in SEQ ID NO:1.

The specification discloses the human intestinal sodium phosphate co-transporter (Npt2B) polypeptide (SEQ ID NO:1). The specification discloses a variety of sodium phosphate co-transporters have been identified, and a variety of disease conditions are associated with disorders in Pi metabolism (page 2). The specification further discloses an extensive list of disorders associated with disorders in Pi metabolism (page 2). Further the specification discloses methods of treating abnormalities in Pi metabolism are varied (page 2). Members of

sodium phosphate co-transporter family are also highly divergent in their effects, and ligand specificity. The outcome of the cellular signaling effect varies depending on the specific sodium phosphate co-transporter and the substrate activating said co-transporter. There is no experimental data provided on the specific functionality of the claimed Npt2B. there is no disclosure of the specific ligands that activate or bind. Based solely on the homology data to sodium phosphate co-transporters and the general classification into the superfamily of sodium phosphate co-transporter, the specification discloses the claimed Npt2B is useful for a variety of applications, including research, diagnostic, and therapeutic agent screening applications, treatment therapies. There is no clear nexus between any treatable diseases/disorders and use of claimed Npt2B. There is no disclosure of the specific activity of claimed sodium phosphate co-transporter or how to assay for said activity. In light of the specification the skilled artisan can not come to any conclusions as to the function of claimed sodium phosphate co-transporter of SEQ ID NO:1 .

The utility of claimed protein cannot be implicated solely from homology to the proteins known in the art because the art does not provide teaching stating that all protein disclosed have the same activity, same effects, the same ligands and are involved in the same disease states. In light of the specification and art the skilled artisan can not come to any conclusions as to the function of protein encoded by claimed nucleic acid. There is no disclosure provided within the instant specification on what specific function the protein of SEQ ID NO:1 possesses, or how to specifically assay for such, ligands that bind, promoters

that activate; nor are any cell types/tissues disclosed that specifically nor are any disease states disclosed that are directly related to said protein dysfunction.

The specification fails to disclose, what disease is associated with claimed sodium phosphate co-transporter dysfunction or what drugs affect specific claimed sodium phosphate co-transporter function. The claims, specification, nor prior art disclose the ligand that binds claimed sodium phosphate co-transporter, the activity associated with claimed sodium phosphate co-transporter or, how the activity is modulated, and how the modulation or activity is determined using specific assay steps. The claimed sodium phosphate co-transporter may have utility in the future, when it has been further characterized (e.g. its dysfunction or function correlated with a disease state) and its ligand or functionality determined. The inclusion in the family of sodium phosphate co-transporter does not constitute either a specific and substantial asserted utility or a well established utility for claimed Npt2Br protein. This is analogous to all proteins/nucleic acid of sodium phosphate co-transporter proteins can be used as markers on a gel.

Specification discloses claimed sodium phosphate co-transporter are useful in screening but the specification does not disclose what claimed sodium phosphate co-transporter specifically regulates and what specific disease, claimed sodium phosphate co-transporter, is a target for. What would be the use of using the claimed sodium phosphate co-transporter on a panel for drug screening? The TMP sodium phosphate co-transporter has no known ligand or known function. How would one use the compounds that interacted with said

orphan sodium phosphate co-transporter? The specification provides a diverse list of disease states that may be involved in Pi dysfunction. It is unpredictable what ligands will bind to Npt2B and what is the result of said binding. Further the functional effects of ligand binding and compound transport may remain uncertain even after extensive experimentation. What is the utility for a ligand ,in many cases with no known function, that binds to a Npt2B of no known function? The ordinary artisan can only speculate on the utility for the ligand and Npt2B. A utility to orphan Npt2B cannot be assigned without knowledge of what disease is associated with claimed Npt2B dysfunction or what drugs/ligands effect a specific claimed Npt2B function. The superfamily of sodium phosphate co-transporters are highly divergent in their effects and compound specificity. The utility of claimed sodium phosphate co-transporter cannot be implicated solely from homology to known sodium phosphate co-transporter or their protein domains because the art does not provide teaching stating that all members of family of sodium phosphate co-transporter must have the same effects, the same ligands and be involved in the same disease states, the art discloses evidence to the contrary. Specification has used protein homology are predictive as to the activity of the protein. The utility of claimed sodium phosphate co-transporter cannot be implicated solely from homology to known sodium phosphate co-transporter or their protein domains because the art does not provide teaching stating that all members of family of sodium phosphate co-transporter must have the same effects, the same ligands, and be involved in the same disease states, the art discloses evidence to the contrary (see above)

Bork (Nature Genetics, Vol. 18, pages 313-318, 1998) provide a review article disclosing the problems of using homology detection methods to assigning function to related members of a family. Bork discloses: a) "While current homology detection methods can cope with data flow, the identification, verification and annotation of functional features need to be drastically improved", page 313, column 1, Abstract, b) there are two bottle necks that need to be overcome en route to efficient functional predictions from protein sequences, i.e., "First, there is the lack of a widely accepted, robust and continuously updated suite of sequence analysis methods integrated into coherent and efficient prediction system. Second, there is considerable 'noise' in the presentation of experimental information, leading to insufficient or erroneous function assignment in sequence databases", page 313, column 1, third paragraph, c) "In-depth analysis of protein sequences often results in functional predictions not attained in the original studies", page 313, column 2, last paragraph, d) "However, more often than not, it is clear that the cellular role of the protein in question differs from that of the detected homologue(s) and there is currently no automatic means to establish how much functional information can be legitimately transferred by analogy from homologue to the query", page 315, column 2, last paragraph, e) pertaining to predictions of protein function, "Do not simply transfer functional information from the best hit. The best hit is frequently hypothetical or poorly annotated; other hits with similar or even lower scores may be more informative; even the best hit may have a different function", while "many proteins are multi functional; assignment of a single function, which is still

common in genome projects, results in loss of information and outright errors" and "It is typical that the general function of a protein can be identified easily but the prediction of substrate specificity is unwarranted; for example, many permeases of different specificity show approximately the same level of similarity to each other", page 316. Karp (Bioinformatics, Vol 14, No.9, pages 753-754, 1998) has disclosed the problems of using functional prediction based on homology analysis. Karp states, a) "Although we know the accuracy with which sequence homologs can be determined, we know little about the accuracy of the overall process of assigning function by homology, page 753, column 2, second paragraph, b) "We have more faith in the correctness of those sequences whose functions we determined experimentally, rather than through computational means, page 753, column 2, last paragraph, c) "research is required to estimate the error rate of functional annotation by different methods of computational sequence analysis", page 754, column 2, last paragraph. Bork (Current Opinion in Structural Biology, Vol 8, pages 331-332, 1998), discusses the problems with deriving biological knowledge from genomic sequences and states, "structural similarity does not lead to iron-clad functional predictions" page 331, column 2 last paragraph, "Structural similarity does not necessarily mean a common evolutionary origin" page 332, column 1, second paragraph, and "Today, what we predict from sequences is at best fragmentary and qualitative", page 332, column 2, second paragraph. Therefore, references discussed above disclose the unpredictability of assigning a function to a particular protein based on

homology, especially one that belongs to the family sodium phosphate co-transporter which have very different ligand specificity and functions.

It can be argued the claimed sodium phosphate co-transporter protein is useful as a tool as a reagent and as a molecular target in the diagnosis and treatment of sodium phosphate co-transporter mediated disorders. All members of the sodium phosphate co-transporter protein family have a utility in selectively screening of candidate drugs that target sodium phosphate co-transporter. However, for a utility to be "well-established" it must be specific, substantial. In this case, as all sodium phosphate co-transporter are in some combination useful in selectively screening of candidate drugs that target sodium phosphate co-transporter and in toxicology testing. However, the particulars of screening of candidate drugs, that target claimed sodium phosphate co-transporter, and in toxicology testing are not disclosed in the instant specification. Neither the candidate drugs or toxic substances nor the susceptible organ systems are identified. Therefore, this is a utility which would apply to virtually every member of a general class of materials, such as any collection of proteins or DNA, but is only potential with respect to SEQ ID NO:1. Because of this, such a utility is not specific and does not constitute a "well-established" utility. Further, because any potential diagnostic utility is not yet known and has not yet been disclosed, the utility is not substantial because it is not currently available in practical form. Moreover, use of the claimed protein for screening compounds that are a target for claimed sodium phosphate co-transporter protein is only useful in the sense that the information that is gained from the assay and is dependent on the effect

it has on the protein, and says nothing with regard to each individual sodium phosphate co-transporter family. Again, this is a utility which would apply to virtually ever member of a general class of materials, such as any collection of proteins or DNA. Even if the expression of Applicants' individual sodium phosphate co-transporter protein is affected by a test compound in an assay for drug screening, the specification does not disclose any specific and substantial interpretation for the result, and none is known in the art. Given this consideration, the individually claimed method of using sodium phosphate co-transporter protein has no "well-established" use. The artisan is required to perform further experimentation on the claimed sodium phosphate co-transporter protein itself in order to determine to what "use" any information regarding this protein could be put.

With regard to diagnosis of disease, in order for a protein to be useful, as asserted, for diagnosis of a disease, there must be a well-established or disclosed correlation or relationship between the claimed sodium phosphate co-transporter protein and a disease or disorder. The presence of claimed sodium phosphate co-transporter protein in tissue is not sufficient for establishing a utility in diagnosis of disease in the absence of some information regarding a correlative or causal relationship between the expression of the claimed sodium phosphate co-transporter protein and the disease. If a molecule is to be used as a surrogate for a disease state, some disease state must be identified in some way with the molecule. There must be some expression pattern that would allow the claimed sodium phosphate co-transporter protein to be used in a diagnostic

manner. Many proteins are expressed in normal tissues and diseased tissues. Therefore, one needs to know, e.g., that the claimed sodium phosphate co-transporter protein is either present only in, e.g. cancer tissue to the exclusion of normal tissue or is expressed in higher levels in diseased tissue compared to normal tissue (i.e. over expression). Evidence of a differential expression might serve as a basis for use of claimed sodium phosphate co-transporter protein as a diagnostic for a disease. However, in the absence of any disclosed relationship between the claimed sodium phosphate co-transporter protein and any disease or disorder and the lack of any correlation between the claimed sodium phosphate co-transporter protein with any known disease or disorder, any information obtained from an expression profile would only serve as the basis for further research on the observation itself. "Congress intended that no patent be granted on a chemical compound whose sole 'utility' consists of its potential role as an object of use-testing." *Brenner*, 148 USPQ at 696. The disclosure does not present a substantial utility that would support the requirement of 35 U.S.C. §101.

Further, sodium phosphate co-transporter family to which the polypeptide of SEQ ID NO:1 belongs is a family in which the members have divergent functions based on which tissues the protein is expressed or administered to. Assignment to this family does not support an inference of utility because the members are not known to share a common utility. There are some protein families for which assignment of a new protein in that family would convey a specific and utility to that protein. For example, some families of enzymes such

as proteases, ligases, telomerases, etc. share activities due to the particular specific biochemical characteristics of the members of the protein family such as non-specific substrate requirements, that are reasonably imputed to isolated compositions of any member of the family. The diversity of the sodium phosphate co-transporter family has already been described. Without some common biological activity for the family members, a new member would not have a specific or substantial utility when relying only on the fact that it has structural similarity to the other family members. The members of the family have different biological activities which may be related to tissue distribution but there is no evidence that the claimed compounds share any one of diverse number of activities. That is, no activity is known to be common to all members. To argue that all the members can be used for drug screening, toxicology testing and diagnosis, is to argue a general, nonspecific utility that would apply to virtually every member of the family, contrary to the evidence. Further, any compound could be considered as a regulator or modulator of tissue in that any compound, if administered in the proper amount, will stimulate or inhibit tissue. For example, salt, ethanol, and water are all compounds which will kill cells if administered in a great enough amount, and which would stimulate cells from which these compounds had been withheld, therefore, they could be considered regulators or modulators of tissue. However, use of these compounds for the modulation of tissue would not be considered a specific and substantial utility unless there was some disclosure of, for example, a specific and particular

combination of compound/composition and application of such in some particular environment of use.

Without knowing a biological significance of the claimed sodium phosphate co-transporter protein, one of ordinary skill in the art would not know how to use the claimed invention in its currently available form in a credible "real world" manner based on the diversity of biological activities possessed by the sodium phosphate co-transporter family. Contrast *Brenner*, 148 USPQ at 694 (despite similarity with adjacent homologue, there was insufficient likelihood that the steroid would have similar tumor-inhibiting characteristics), with *In re Folkers*, 145 USPQ 390, 393 (CCPA 1965) (some uses can be immediately inferred from a recital of certain properties) or *In re Brana*, 34 USPQ 1436, 1441 (Fed. Cir. 1995) (evidence of success in structurally similar compounds is relevant in determining whether one skilled in the art would believe an asserted utility; here, an implicit assertion of a tumor target was sufficiently specific to satisfy the threshold utility requirement).

The assertion that the claimed invention has utility in drug screening, drug development and disease diagnosis, do not meet the standards for a specific, substantial or well-established utility for reasons set forth above. None of the utilities identified have been demonstrated to be specific to the polypeptide of SEQ ID NO:1 . One of ordinary skill in the art must understand how to achieve an immediate and practical benefit from the claimed species based on the knowledge of the class. However, no practical benefit has been shown for the use of the polypeptide SEQ ID NO:1. Applicant has failed with respect to

claimed sodium phosphate co-transporter protein, has not described the family of sodium phosphate co-transporter in enough detail to show, by a preponderance of the evidence, that the polypeptide of SEQ ID NO:1 has any substantial use. The record shows that the family of sodium phosphate co-transporters is diverse, and has such a broad definition, that a "common utility" cannot be defined. Moreover, the evidence of record is inadequate to determine the disease(s), drug(s) or toxicological screen(s) for which the compounds would be useful. In *Brenner,* the Court approved a rejection for failure to disclose any utility for a compound where the compound was undergoing screening for possible tumor-inhibiting effects and an adjacent homologue of the compound had proven effective. *Brenner*, 148 USPQ at 690. Here, there is no evidence that the claimed isolated compounds have any utility.

For all the above reasons, the disclosure is insufficient to teach one of skill in the art how to use the invention.

The use of the claimed invention for toxicology testing, drug discovery, and disease diagnosis are not substantial utilities. The question at issue is whether or not the broad general assertion that the claimed sodium phosphate co-transporter protein might be used for some diagnostic application in the absence of a disclosure of which diagnostic application would be considered to be an assertion of a specific, substantial, and credible utility. For reasons set forth above the disclosure satisfies none of the three criteria *See In re Kirk*, 153 USPQ 48, 53 (CCPA 1967) (quoting the Board of Patent Appeals, 'We do not believe that it was the intention of the statutes to require the Patent Office, the

courts, or the public to play the sort of guessing game that might be involved if an applicant could satisfy the requirements of the statutes by indicating the usefulness of a claimed compound in terms of possible use so general as to be meaningless and then, after his research or that of his competitors has definitely ascertained an actual use for the compound, adducing evidence intended to show that a particular specific use would have been obvious to men skilled in the particular art to which this use relates.')

The prior rejection under § 101 followed *Brenner v. Manson*. In that case, the absence of a demonstrated specific utility for the claimed steroid compound was not ameliorated by the existence of a demonstrated general utility for the class. Unlike *Fujikawa v. Wattanasin*, where there were pharmaceutically acceptable in vitro results, here, there is nothing other than relatively low levels of sequence homology to a broad and diverse family of proteins having distinct modes of activity, and no disclosed common mode of action. A rejection under § 112, first paragraph, may be affirmed on the same basis as a lack of utility rejection under § 101. *See, e.g., In re Swartz*, 56 USPQ2d 1703 (Fed. Cir. 2000); *In re Kirk*, 153 USPQ 48 (CCPA 1967

3. Claim 1 is also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention. Since neither the specification nor the art of record disclose any activities or properties that would constitute a "real world" context of use for the

claimed sodium phosphate co-transporter (SEQ ID NO:1) further experimentation is necessary to attribute a utility to the claimed sodium phosphate co-transporter. Specifically, since the claimed invention is not supported by either a specific or substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art would not know how to use the claimed invention so that it would operate as intended without undue experimentation.

Objections

The disclosure is objected to because of the following informalities:

4. Applicants are required to use the heading "Brief Description of the Drawings" to describe the drawings. See MPEP 608.01(f). On page 3, Applicant has written "BRIEF DESCRIPTION OF THE FIGURES"

Appropriate correction is required.

5. The drawings are objected to because the figures should be labeled as Figure 2A and 2B, or Fig. 2A or Fig. 2B or the equivalent, as required by 37 C.F.R. § 1.84 (u)(1). The Figures must also be described in the Brief Description of the Drawings as Figures 2A-B. Appropriate correction is required.

Appropriate correction of the drawing as indicated by examiner in this Office action is required.

Corrections to drawings cannot be held in abeyance. Applicant must submit proposed drawing corrections in response to the requirement in the Office action.

Timing of Corr ctions

Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.85(a). Failure to take corrective action within the set period will result in **ABANDONMENT** of the application.

6. No claim is allowed

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nirmal S. Basi whose telephone number is 703-308-9435. The examiner can normally be reached on 9:00 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on 703-308-6564. The fax phone number for the organization where this application or proceeding is assigned is 703-308-4242.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1234.

Nirmal S. Basi
Art Unit 1646
11/16/03

YVONNE EYLER, PH.D
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600